

Modeling and Design of High-Rise Statue of Lard Shree Ram using Staad-Pro Software

MD. Hashmi¹, Pratiksha Malviya²

¹M.Tech Scholar, ²Professor, ^{1,2}Department of Civil Engineering,

^{1,2}Millennium Institute of Technology & Science, Bhopal, Madhya Pradesh, India

How to cite this paper: MD. Hashmi | Pratiksha Malviya "Modeling and Design of High-Rise Statue of Lard Shree Ram using Staad-Pro Software" Published in International

Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-3 | Issue-5, August 2019, pp.2008-2012, <https://doi.org/10.31142/ijtsrd27912>



IJTSRD27912

Copyright © 2019 by author(s) and International Journal of Trend in Scientific Research and Development Journal. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0) (<http://creativecommons.org/licenses/by/4.0>)



INTRODUCTION

Integrating design processing using various designing and modelling software's in high-rise sculpture creates new opportunities for aesthetics discovery. These technologies enable artists to make high rise sculptures and provide safety, modify and disseminate art and make possible a new type of work. By using a behaviour-based software architecture to control a sculptures movement, complex series of coordinated motion can be performed in response to the sculpture's environment and in relation to its internal state. Adding behaviour to sculpture changes the conversation between people and sculpture. As people directly influence the movement of sculpture, the results of this conversation can be stored by sculpture and used to modify the course of future interaction and behaviour. It provides the foundation of a new dialogue between the sculptor, sculpture and the audience.

After studying numerous statues of Patel across the country, a team of historians, artists, and academics chose to proceed with a design submitted by the Indian sculptor, Ram Sutar. The Statue of Unity is a much larger replica of a statue of the leader installed at Ahmedabad International Airport Commenting on the design.

HISTORY OF HIGH-RISE STATUE

Because ancient times could see buildings, which was made apart from being functional Demonstrate the power and wealth of the investor. Such an exhibit of extravagant objects Not only does the immediate surrounding area, but also the neighbouring land have considerable impact.

Seven wonders in those days there were some of the world's most famous buildings. Those seven buildings were being seen by tourists, who generated significant revenue for the surrounding area. The pyramid of chips (about 140 meters) and the light pillar of Alexandria (about 120 meters). They were not only exceptionally high their form could also be considered special. Different types of such things in Cityscape were highly desirable and were appreciated later. Some high-rise statues are described below.



Figure: 1.3- Statue of Liberty

Literature Survey

General

RESEARCH BACKGROUND

1. Gujarat: Sardar Patel statue to be twice the size of Statue of Liberty". CNN-IBN. 30 October 2013. Archived from the original on 31 October 2013. Retrieved 30 October 2013.
2. Arkin, Ronald C. Behavior-Based Robotics. MIT Press. Cambridge, MA. 1998. Review of philosophy and architecture of behavioral robotic systems.
3. Ashby, Ross W. An Introduction to Cybernetics. Chapman & Hall, LTD. London. 1957.
Blumberg, Bruce. Old Tricks, New Dogs: Ethology and Interactive Creatures. Ph.D. Thesis. Massachusetts Institute of Technology.
4. Braitenberg, Valentino. Vehicles, Experiments in Synthetic Psychology. MIT Press. Cambridge, MA. 1984. Brooks, Rodney A. Cambrian Intelligence, The Early History of the New AI. The MIT Press. Cambridge, MA. 1999.
5. Burnam, Jack. Beyond Modern Sculpture. George Braziller, 1967. Chapuis, Alfred and Edmond Droz. Translated by Alec Reid. Automata, A Historical and Technological Study. Editions du Griffon. Neuchatel, Switzerland. 1958. Thorough chronology of automata from pre-history – 1950s.

OBJECTIVES OF THE THESIS

The aim of this thesis project is modelling and designing of a high-rise statue of Lord Shree Ram by using different software's such as STAAD.PRO, AUTO CAD & SKECH UP etc. The statue of Lord Shree RAM is generated in Auto-cad software. Length of the statue is very high and it is placed on a high-rise pedestal. The height of the statue is considered as 74 meter and the height of pedestal is considered as 21 meters for modelling and design for the wind load as well as seismic load mainly.

ANALYSIS & RESULTS

For model analysis, the combined action of DL, LL, WL & EQ forces are considered. The structure model has been modelled using STAAD.pro software. Total twenty-five combinations of different load conditions are generated and applied. For design of a slab and shear wall the four nodes plate is used. These plates are supported on beams supported by cylindrical columns.

The supports are taken as fixed support in study and the cross sections of beam are assumed as rectangular in geometry and circular for columns.

The live load is taken as -4 KN/m^2 and floor load is taken as -3 KN/m^2 . The minus sign represents that force is acting toward the gravity in Y-direction. Only outer wall load is considered as UDL of 69.75 KN/m for analysis in all models. Inner wall load is not considered as model analysis. The frame model is analysed in STAAD.pro V8i and the storey drift, average displacement, beam stresses column stress, and beam moments and column moment are calculated.

The different design Codes are used for analysis: -

RCC Design - IS 456:2000

Seismic Loads - IS 1893:2005 (Part 1)

Dead Loads - IS:875-1987 (Part 1)

Live Load IS:875-1987 (Part 2) Wind Load IS:875-1987 (Part 3)

The different cross-sections used in conventional slab models and flat slab models in different geometry are given below: -

- Grade of concrete M60
- Grade of steel Fe-500
- Beam sizes = $300 \text{ mm} \times 450 \text{ mm}$, $500 \text{ mm} \times 900 \text{ mm}$, $600 \text{ mm} \times 1000 \text{ mm}$.
- Column sizes = circular columns having diameter 750 mm , 900 mm and 1000 mm .
- Slab thickness = 200 mm

DETAILING OF RCC STRUCTURE

Detailing of RCC structure will conform to IS: 456. As the structure is located in the low seismic area thus for ductility requirement the guidelines of IS: 13920 shall be followed as per Response Reduction factor of 5.

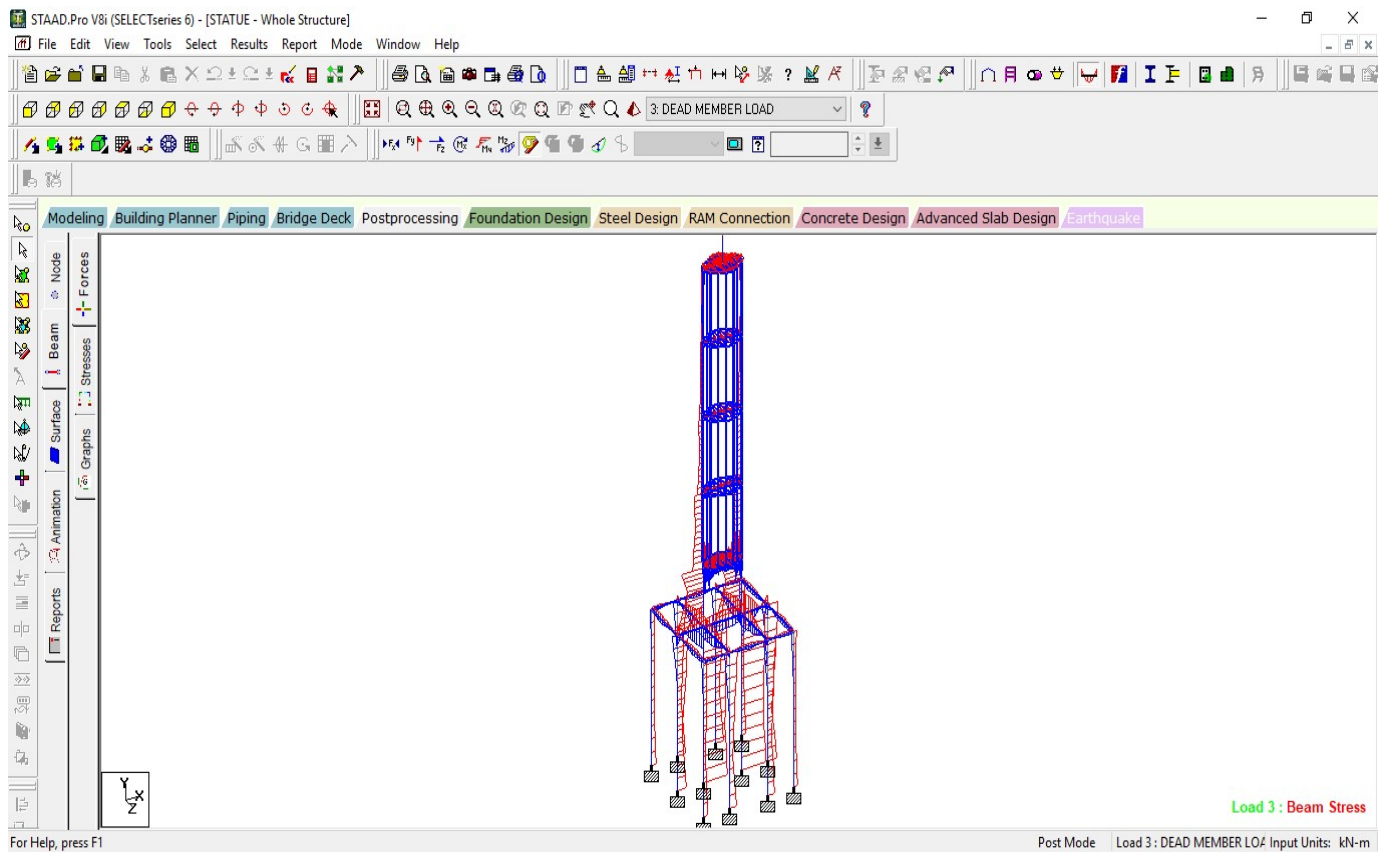


Fig. Staad- pro model showing Beam Stress

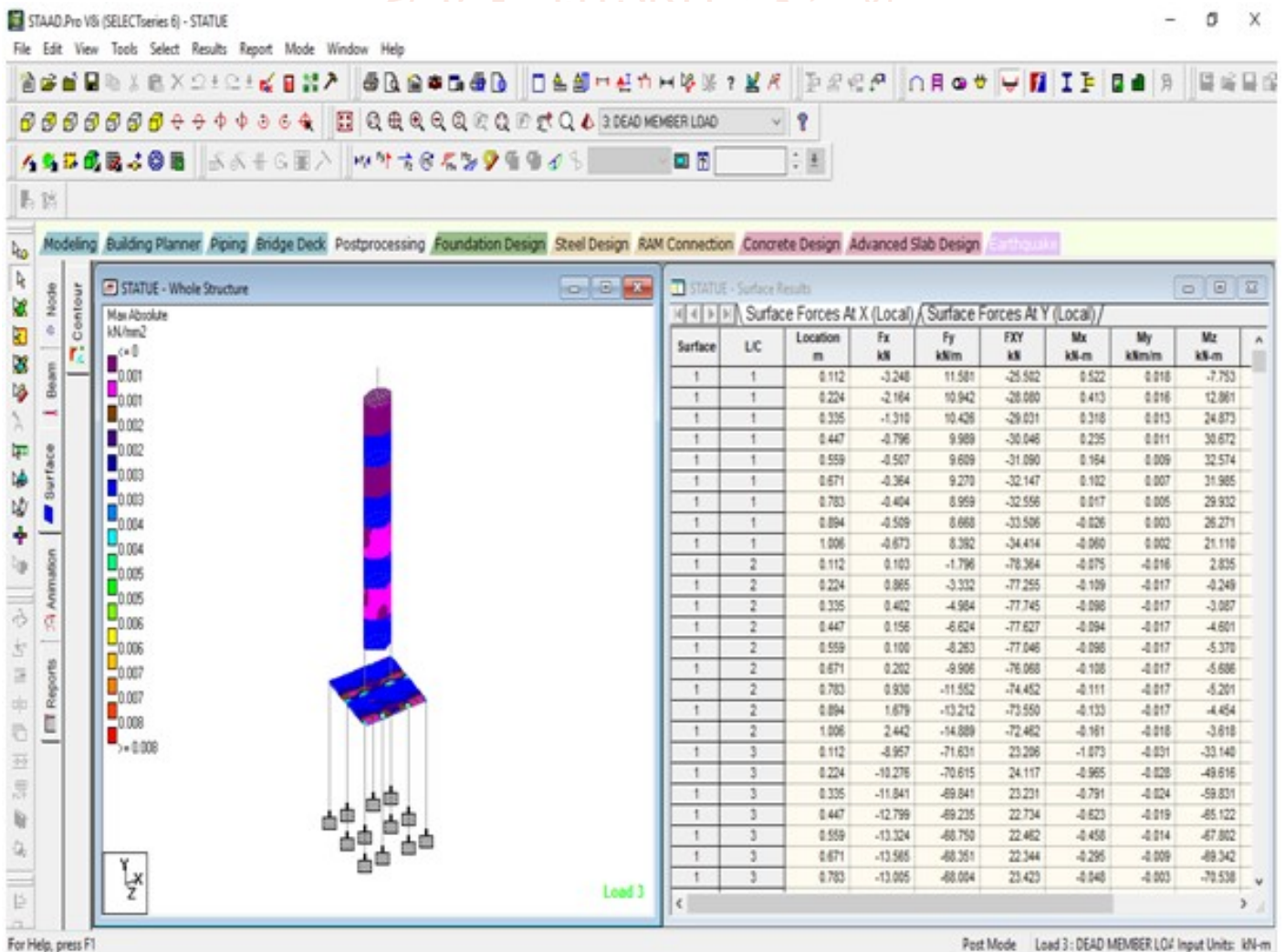


Fig. Staad- pro model showing Axial Load MAXIMUM BEAM MOMENT

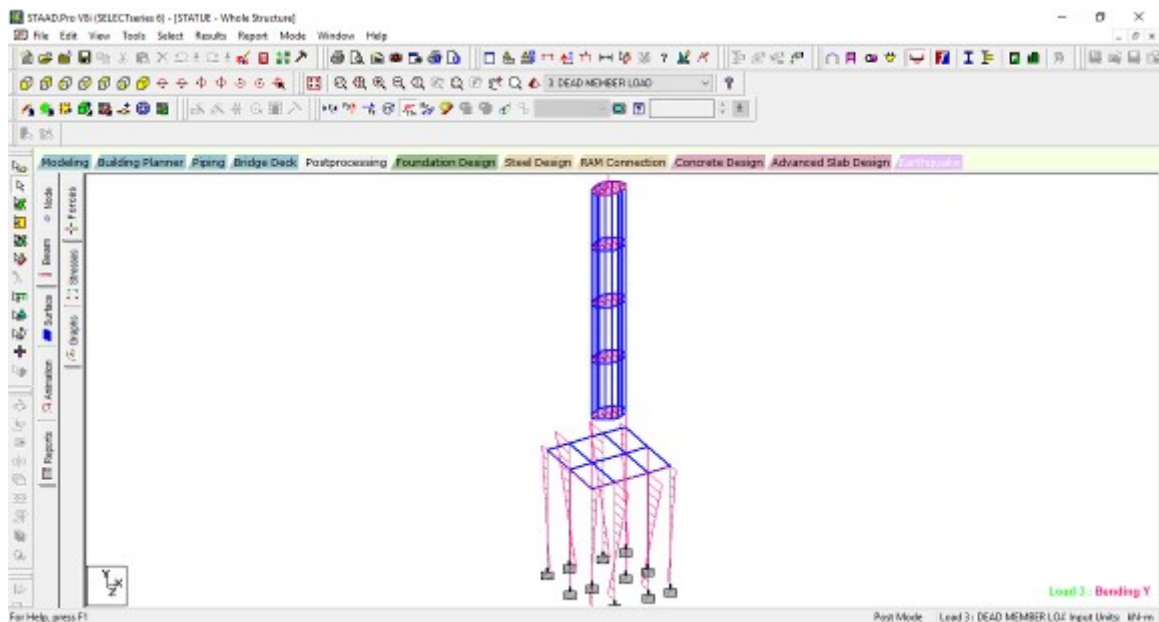


Fig.Staad- pro model showing Bending moment in Y direction

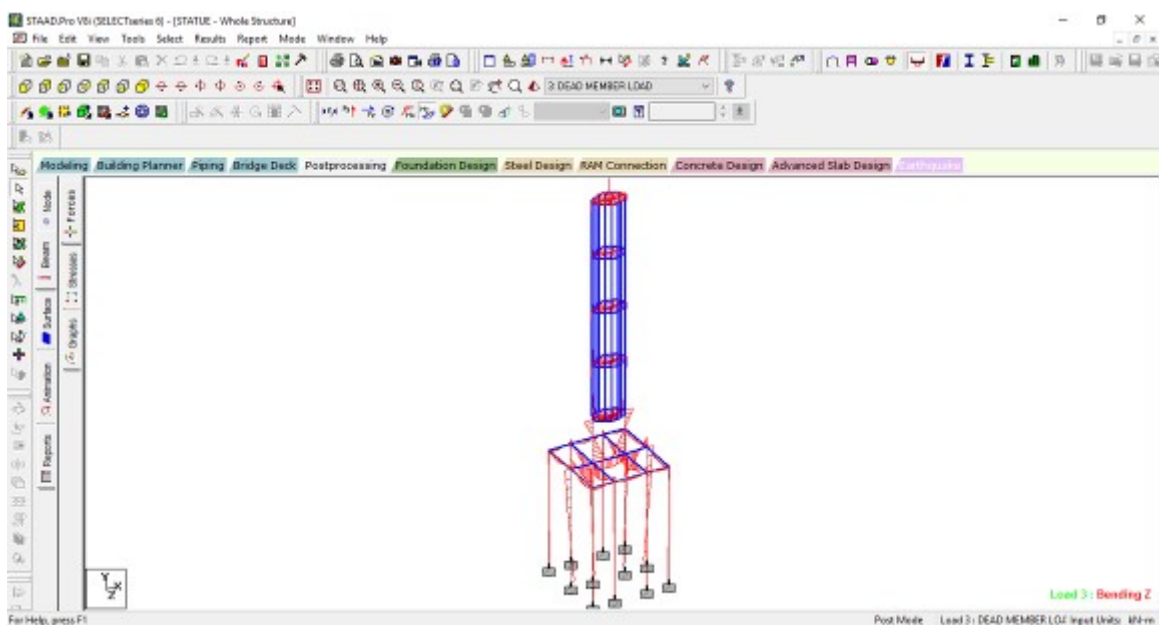


Fig. Staad- pro model showing Bending moment in Z direction

MAXIMUM NODAL DIFLECTION

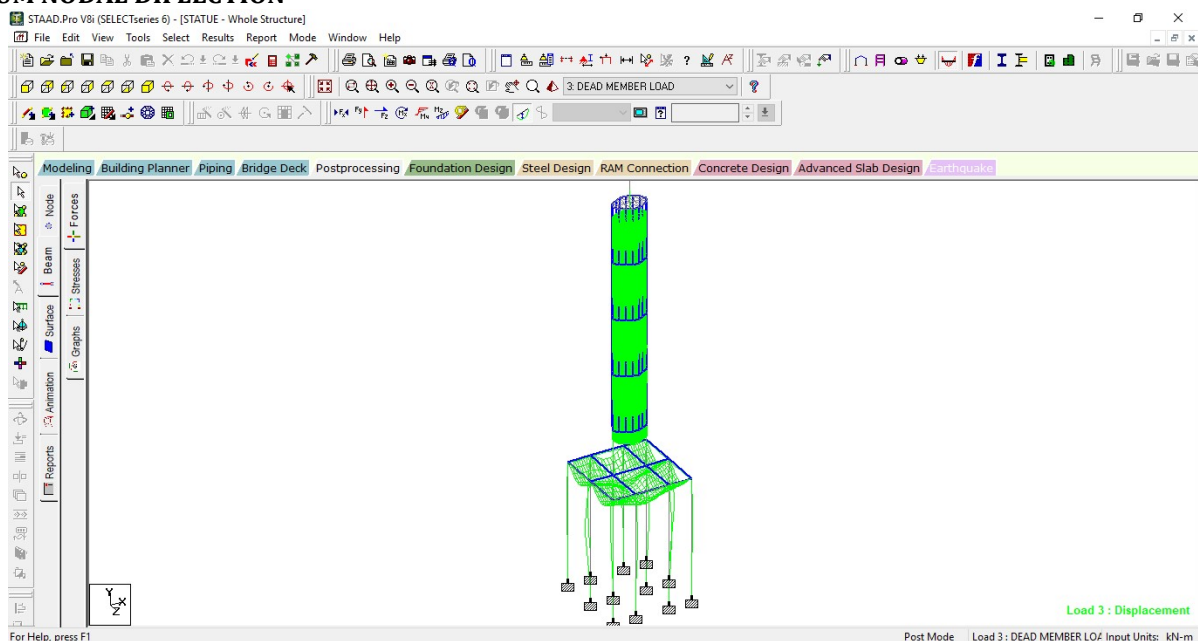


Fig. Staad- pro model showing Displacement in Y direction

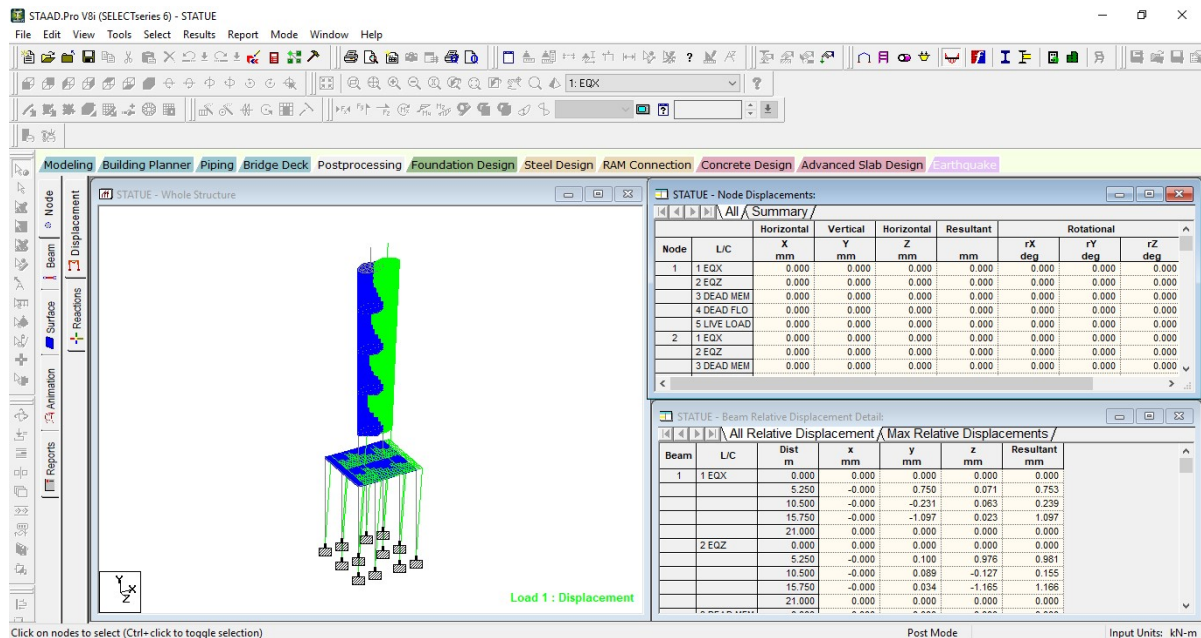


Fig. Staad- pro model showing Horizontal Displacement

CONCLUSION

It is evident from the above results that the seismic hazard has to be carefully evaluated before the construction of important and high-rise structures. Normally the base of the any high-rise structure or statue is larger than the top of the statue or high-rise structure to provide lateral stability of the structure but in our case, it is reverse which is restricted to supported in only two columns shown for feet. And hence it is challenging for designer to design the feet to support the hole statue structure. Based on the above analytical study carried out by the model structures.

REFERENCES

- [1] Bozorgnia Y, Bertero V, "Earthquake Engineering: From Engineering Seismology to Performance-Based Engineering", CRC Press, 2004.
- [2] Chandwani Vinay, Agrawal Vinay, Gupta and Naveen Kumar (2012), "Role of Conceptual Design in High Rise Buildings.", Vol. 2, Issue 4, July-August 2012, pp.556-560.
- [3] Charlwood, R, et al., 2009, "The Specification and Quality Control of Concrete for Dams," Commission International des Grands Barrages, Bulletin 136, pp.59-66.
- [4] Choudhury, P, Rastogi, B, Kumar, S, Aggarwal, S, 2011, "The seismic Hazard Analysis Report," ISRT Technical Report No.5 1, Institute of Seismic Research, Department of Science and Technology, Govt. of Gujarat, India, March 2011.
- [5] Emrah Erdogan (2008), "Assessment of current nonlinear static procedures on the estimation of torsional effects in low-rise frame buildings in sloping ground", Engineering Structures 30 (2008):2548-2558.
- [6] Gourabi, A. and Yamani, M. (2011) Active Faulting and Quaternary Landforms Deformation Related to the Nain Fault on sloping ground. American Journal of Environmental Sciences, 7, 441-447.
- [7] Guan Y.H., et al. (2011) Studied on the Earthquake Disaster Reduction Information Management System and Its Application. International Journal of Intelligent Systems and Applications, Vol-1, pp51-57.
- [8] Hajra B and Godbole P. N. (2006). "Along Seismic Load on Tall Buildings Indian Codal Provisions." 3NCWE06 Kolkata, pp285-292.
- [9] Halkude and Mahamuni (2014) "Comparison of various methods of analysis of grid floor frame" International Journal of Engineering Science Invention ISSN (Online): 2319 - 6734, Volume 3 Issue 2 February 2014 PP.01-07,
- [10] Indian Standards.1997, IS:875(Part3)-1987 Indian Standard Code of practice for design loads (other than earthquake) For buildings and structures Part3 Wind Loads (Second Revision). India
- [11] Indian Standards.2002, IS:1893(PartI), 2002: Indian Standard Criteria for Earthquake Resistant Design of Structures. India Statue of Unity Website, 2015, Available from: <http://www.statueofunity.in>.[02 February 2015].
- [12] IS 1893 (Part-I) 2002: Criteria for Earthquake Resistant Design of Structures, Part-I General Provisions and Buildings, Fifth Revision, Bureau of Indian Standards, New Delhi.
- [13] IS 875(1987), Indian Standard Code of practice for Design loads for buildings and structures, Bureau of Indian Standards, New Delhi. Ashraf Habibullah, Stephen Pyle, Practical three-dimensional non-linear static and dynamic analysis, Structure Magazine, winter, 1998 FEMA-356(2000), Pre standard and Commentary for the seismic Rehabilitation of buildings, American Society of Civil Engineers, USA.
- [14] Pancholi, D, 2010, "Report on Sadhu's Hut Site for Locating Statue of Sardar Patel," Vadodara, India, 08 September 2010.
- [15] Robertson, A, Roux P, Gratraud, J, et al. 2002. Wind Pressure on Permeably and Impermeably-Clad Structures, Journal of Wind Engineering and Industrial Aerodynamics 90, Silsoe Research Institute, UK, pp.461-474.
- [16] USGS. 2013, Worldwide Seismic Design Tool (Beta) Available from: <http://geohazards.usgs.gov/designmaps/ww/>.[01 May 2013].
- [17] Wapcos Limited, 2013, "Geological and Geo technical Investigation for "Statue of Unity" at Sadhu Hill on the Downstream of Sardar Sarovar Dam," WAPCOS Limited, Amedabad, India, 10 January 2013.